

richness of color and perfection of form by even the more pretentious members of the genus *Cypræa*.

Among the most charming of the 55 or 60 accepted species, *O. porphyria* Lam. (Fig. 3) may be safely reckoned. These are the "tent shells" of the amateur collector, being so-called from the peculiar patterns which often cover the surface in such profusion as to suggest a large military encampment, including the marquees supposed to be necessary for official comfort, etc.

The ground color, on which these tent-like figures appear, is of a deep chocolate hue and exceedingly brilliant. Add to this the graceful form of the shell and we may readily see that the combination presents a picture of the utmost beauty.

O. cryptospira Ford (Figs. 4, 5) is smaller and less charming in appearance than *O. porphyria*, but the callus-covered spire and enamelled body whorl make it a very interesting species. The type of this is in my own collection. There is, however, a fine suite of typical specimens in the Phila. Acad. Nat. Sciences, and, I think, a similar set in the U. S. National Museum at Washington.

DESCENT AND DISTRIBUTION OF UNIONIDÆ.

BY BERLIN H. WRIGHT, PENN YAN, N. Y.

It must be admitted that the Unionidæ are under the same natural laws, and occult forces, that have operated for vast ages on all animal and vegetal life. Fossilized Unios are found in several geological formations, and all living Unios are their descendants, or else they are new creations. But no evidence sustains the theory of successive creations. On the contrary, we behold everywhere successive new but related forms of descent on divergent lines. Nowhere is this astonishing fact better exemplified than in the numerous species of Unionidæ. But what causes the new forms? If not direct creations—a baseless theory—they are the outcome of changed conditions of life or varying environments.

Geographical distribution furnishes such environments. The young fry of the Naiads have a byssus which generally disappears early and with this appendage they can and do attach themselves to the legs of ducks, wading birds and floating objects. They are then easily transported by the semi-annual bird migration, from river to river, and from lake to lake, and eventually to very remote

regions. New habitats, with new climates, and with changed chemical qualities of new waters, and with new food materials, must disturb the usual and normal lines of descent. A change in the activity of functions of organs, affecting the physiology of the animal must result. Over stimulation of some functions, and depressed activity of others, must change the tenor of life, ultimately evolving new shell characters, and minimizing old ones, or even reducing them to a rudimentary state—all being effected by change of environment.

The dispersion of species is scarcely affected by mountain ranges, but oceans are potential barriers. Distribution eastward or westward is very slow, owing to the fact that the migrations of water fowls and birds, is mainly from north to south and *vice versa*. The spawn, fry or seeds being carried in these migrations, causes a great mixing of fauna and flora, on the lines of migration.

The paucity of Unionidæ west of the 100th meridian is probably due to the fact that since the laying of the cretaceous beds there and the destruction of the once numerous forms of Naiads that swarmed in that region, by the great upheavals of the country—there has not been sufficient time to repopulate. There are signs, however, of adventive Naiads, even from Europe, there. *Margaritana (Unio) margaritifera* L. and *Anodonta cygnea* L. from Europe, neither of them fully divorced from their Old World progenitors, seem to have somehow got a lodgement in California and Oregon, though Drs. Lea and Gould did not detect it. Mr. Simpson suggests that the Californian *A. cygnea* is the parent of the "tramp" *A. exilior* Lea, found from Southern California to Mexico and Central America, where it resents having relatives in Europe.

The most common Unios are those most subject to variation, as seen in *U. complanatus* Sol., whose progeny are clamoring for "sovereign rights" and recognition, which some Uniologists grant, and others deny. On the other hand Naiads vigorously resisting variation, such as *U. cylindricus* Say, and others, have no near relatives, and are generally rare and with very restricted distribution.

In living plants, secessions from a given and normal type are readily traceable, and in fossil types, floral and faunal, the gradations of differences are well marked. "Connecting links" may be absent, when we seek to trace and run down a species, through the long æons of geologic time. But if a long line of visible road be crossed by a chasm, we cannot resist the conviction that the road was once continuous.

There are no inherent tendencies in a species to depart from itself, but when estrangements do occur, they are effected by ulterior causes, natural or artificial. Where color markings are bleached out in mature shells in clear streams, they are retained in the same species in muddy waters. Shells thin and fragile in cold, limeless, pure water, become thicker and coarser in dirty streams. Spinose and verrucose shells are found in rapid waters, with a maximum development of spines and warts, while the same species in sluggish waters have these characters minimized or even absent. The thin edentate Anodontas of ponds or lakes, need no teeth to keep their valves in place, and hence have none. Nature's argument for an organ or an accessory is the need of it, which is furnished by a process of slow development the heavier species showing rudimentary teeth.

Mr. Darwin, in "The Origin of Species," shows that in a genus having many species, if it has not reached a maximum development, many other species are *still forming* in it. This is confirmed in *Unio* and *Anodonta*, and we may reasonably expect new species will be discovered in them.

Departures of a *Unio* from its parent stock, when seen as features of whole colonies, entitle it to *specific* distinction without hesitation, provided the habitats differ, and to *varietal* distinction where found in company with or near its next in affinity. On such a basis specific recognition is accorded in other branches of zoology, and also in botany. Plenty of land and marine shells, are specifically separated, only by the most minute or *microscopic* differences of the shells. We would not advocate such peering minuteness in the Unionidæ where the tendency to variation is much greater, and where expert comparative anatomists are unable to find distinguishing generic or specific differences in the soft parts.

In the Unionidæ, the constants of nature are few and the differentials many. How then shall a rule be formulated by which we can confidently say a given *Unio* is distinct from another? The hiatus necessary for the founding of a new species must be such an aggregation of differences of character, such an estrangement from its next in affinity, that the gap will be large enough to justify a specific separation of the two. A substantial agreement in the *outline* of two *Unios* may be a fact, and yet other distinctive characters easily and unmistakably separate them. A process of differentiation must be applied in uniology but with extreme care. But just

here we are confronted with the fact that all differential observations are more or less affected with the variable "personal equation" among observers. The measure of conclusions is more or less in error, and the elimination of the variable is not a mathematical possibility. It follows, therefore, that a definition of the word SPECIES is almost an impossibility, the judgment of a naturalist being a controlling factor. This is a serious and unalterable fact. The most unselfish and conscientious naturalists will often radically disagree on the validity of a species. Others without a surplus of conscience, candor or brains, will go on making species *ad libitum*, to the end of time.

As a result of such diffusiveness, the birds, fishes, insects, shells, and plants, have generally been named three or four times over. This condition is discreditable to science, and Congresses of scientists are not able to remedy the evil. An epidemic of this sort is raging in Europe, and the "New School" mills are grinding out species by the hundreds.

The animus of species mongers is often visible, and not praiseworthy. Posing as scientists, they grasp nomenclature and bandy names about football fashion, with a nonchalance that takes away the breath of astonished beholders and raises the hair on end. The vocation of such gentry is that of the "Bulls and Bears," tearing down what others labored hard to build up, and raising standards which a later litter of "Bears" will demolish.

A FEW NOTES ON PISIDIA.

BY DR. V. STERKI.

It is hoped that our fellow conchologists will not feel chilly when reading this title, but kindly excuse the writer for coming again with Pisidia. The *Cycladidae* are in order at present, and the season for collecting is at hand. Many conchologists in the East and West, North and South of our country are prepared to do vigorous collecting, and many others not yet enlisted will probably join them, so that, in all probability, more will be done in this line than at any previous time. And there is no doubt that the results will be highly satisfactory. Almost every sending coming in from the comparatively few places where collecting has been done so far, brought up some new form or forms which may prove to be new species, or varieties, by comparing them with more materials from other places.